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#### SOME GUTTIFERAE OF THE LESSER ANTILLES

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IN THE COURSE of preliminary work leading towards the preparation of a flora of the Lesser Antilles, I have encountered several nomenclatural problems in the genera *Clusia*, *Calophyllum*, and *Rheedia*. The following notes are presented as discussion and clarification of these problems. I have received most generous assistance from Miss Alicia Lourteig, Mr. George Proctor, and Mr. James Dandy in checking historic specimens and illustrations in European herbaria. It is also with gratitude that I acknowledge the support of this work through a grant from the National Science Foundation.

#### CLUSIA

Britton and Millspaugh (Bahama Fl. 281. 1920) and Hitchcock and Green (Prop. Brit. Bot. 160. 1929) selected *Clusia major* L. as the type species of the genus. More recently the *Index Nominum Genericorum* formalized this status. Unfortunately, *Clusia major*, proposed by Linnaeus in the first edition of *Species Plantarum*, was abandoned by him in the second edition and has not been used in floras or monographs in the intervening 209 years. In the interest of stability of well known specific names, one questions the value and the necessity of resurrecting such an epithet. There is, however, no option in the present rules of nomenclature, and so *Clusia major* L. must replace the better known *Clusia alba* Jacq. In the process of this investigation, it became apparent that the nomenclature of nearly every species of *Clusia* in the Lesser Antilles was involved, and several others in the Greater Antilles presented one or more additional problems. These will be discussed in the following paragraphs.

#### Clusia major L.

In the first edition of *Species Plantarum* (p. 509. 1753), Linnaeus described two species of *Clusia*, namely, *C. major* and *C. minor*. The protologue of *C. major*, with the modern equivalents of its supporting literature given in brackets, is the following:

1. CLUSIA foliis aveniis.

Clusia flore albo, fructu coccineo. Plum. gen. 21. [C. alba Jacq.]
Cenchramidea arbor saxis adnascens, obrotundo pingui
folio, fructu pomiformi. Pluk. alm. 92 t. 157. f. 2.
[C. plukenetii Urb.]

Terebinthus folio singulari non alato rotundo succulento, flore pallide luteo. Sloan. jam. 167. hist. 2. p. 97 t. 200. f. 1 [C. flava Jacq.] Raj. dendr. 51 [unknown] major.

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- β. Clusia flore roseo major, fructu subviridi. Plum. gen. 21.
  [C. rosea Jacq.]
- γ. Clusia alia minor: flore albo, fructu virescente. Plum. gen. 21. [possibly C. plumieri, or not known according to Planchon & Triana]

In considering this species, the specimens in the Linnaean herbarium are of little assistance. There are five sheets included under the name of Clusia. Sheet 1224.1 does not appear to be a Clusia. Sheet 1224.2 is annotated, "Clusia alba H. Aublet vix Linnaei J. E. S." The specimen is probably a Clusia. Sheet 1224.3 bears only two detached leaves. One is obviously sessile and is probably Clusia mangle L. C. Rich. ex Planch. & Triana. The other leaf has a petiole and is annotated as Clusia flava ex Herb. Jacq. The remaining two sheets, 1224.4 and 1224.5, represent Mammea americana and Chrysobalanus icaco respectively. In 1760, in his Enumeratio Systematica Plantarum, Jacquin described four species of Clusia but made no reference to Species Plantarum. The species are briefly but validly described and each carries a reference to an illustration. Clusia rosea has the reference "Catesb. Car. 2. t. 99."; C. alba carries "Plum. ic. 87. f. 1."; C. flava bears "Sloane hist. Jam. 2. t. 200. f. 1."; and C. venosa is supported by a reference to "Plum. ic. 87. f. 2." The species published in Jacquin's Enumeratio were normally based on material he collected in the West Indies. Mr. Dandy has pointed out in correspondence that Jacquin sometimes cited published figures from Browne, Sloane, Catesby, and others, but in doing this his intention was to provide the reader with what he supposed was an illustration of his own plant. In his later Selectarum Stirpium Americanarum Historia the same species were usually described at length, more complete references were given, type localities were cited, and often a figure drawn from his own material was published. Unfortunately, Jacquin's herbarium was badly damaged while in the West Indies. Although the remains were purchased by Sir Joseph Banks and are in the herbarium of the British Museum, there is no material of Clusia available. Jacquin, in his Selectarum, in 1763, did publish complete descriptions of the four species of Clusia, along with illustrations of two of them, previously briefly described in the Enumeratio of 1760. It is necessary to accept 1760 as the date of publication of Jacquin's species but to typify them with the data and illustrations of 1763. Three of Jacquin's species, C. alba, C. rosea, and C. flava represent segregates from Linnaeus' C. major. The fourth species, C. venosa, appears to be identical with Linnaeus' C. minor and will be discussed later. In the Selectarum in 1763 Jacquin gave for his C. alba the basic polynomial "Clusia foliis aveniis" and the reference "Linn. sp. pl. I. p. 509," as well as the reference "Clusia flore albo, fructu coccineo. Plum. gen. 21. ic. 87. f. I." although he did not use the Linnaean specific epithet. Jacquin's illustration clearly indicates the same plant as in Plumier's unpublished plate (FIG. 1) which was copied (with alterations) for the Burmann edition.

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FIG. 1. Lectotype of *Clusia major* L. FIG. 85, Dessin aquarellé "Clusia flore albo, fructu coccineo" from Manuscript No. 6, Plumier, *Botanicum Americanum*, t. VI. Courtesy of the Muséum National d'Histoire Naturelle, Paris.

JOURNAL OF THE ARNOLD ARBORETUM [vol. xliii There is no doubt in my mind that Jacquin was renaming *Clusia major* by dividing this composite species and assigning new names to all three parts of it. In the second edition of *Species Plantarum*, also published in 1763, Linnaeus accepted Jacquin's divisions of *Clusia major*, used Jacquin's specific names, credited him, and cited Jacquin's publications. By this act *Clusia major* disappeared and was never again used until Britton and Millspaugh cited it as the type species of the genus.

In 1860, Planchon and Triana (Ann. Sci. Nat. IV. 13: 318–376. 1860) published a detailed treatment of *Clusia* in a larger work considering the Guttiferae as a whole. They concluded that *Clusia major* should be regarded as a *nomen confusum* and cited *C. major* in part under each of the three species mentioned by Jacquin and accepted by Linnaeus. Other monographers have followed suit. Although Hitchcock and Green (*loc. cit.*) selected *Clusia major* as the type species of the genus, they qualified this by stating "senus *C. rosea* Jacq." The *Index Nominum Genericorum* refers to the Hitchcock and Green selection. The qualification is obviously incorrect, for Jacquin's application of the basic references and illustration of *C. major* is to *C. alba* Jacq.

The typification of Clusia major must rest on Jacquin's selection of the Linnaean reference to Plumier's work. The plant in the Linnaean herbarium annotated by J. E. Smith as "Clusia alba H. Aublet vix Linnaeus" is neither the plant Jacquin described, nor does it correspond to the earlier Plumier description. Specimens collected by Plumier exist but none is available for the genus Clusia. Planchon and Triana selected as basic material an unpublished plate of Plumier (FIG. 1) but noted that the Burmann reproduction of this plate contained inaccuracies and excluded the flower and the analytical drawing. Thus the choice of a type then is between a previously unpublished plate and the illustration of C. alba published by Jacquin. I prefer the former, now published in this paper, to detract a bit from the long established status of C. alba. Clusia major L. (syn. C. alba Jacq.) appears to be characterized by the elongate fruits borne on a cymose inflorescence which has a short peduncle. The species is represented by recent collections of material of the Lesser Antillean islands from St. Eustatius, St. Kitts, Montserrat, and Antigua, southward to St. Vincent. Urban's C. plukenetii is similar in having a much elongated peduncle to the cymose inflorescence and a globose fruit. Urban cited a collection from Martinique (Duss 1829) which I have not seen. I have seen more recent material from Barbados (the type locality) and St. Lucia which agrees with Urban's description. Regrettably, considerable variation is found in the shape of the fruits of Clusia major. Although the length of the peduncle appears to be a reliable difference between these species, additional field study is necessary to determine if two taxa are truly represented.

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#### Clusia flava Jacq.

There is no confusion in the use of this name. Linnaeus (Sp. Pl. 509. 1753) included a Sloane reference (Hist. Jam. 2. t. 200, f. 1.) in the literature cited with the original publication of Clusia major. Jacquin (Enum. 34. 1760; Select. 272. 1763) cited the same reference under the name C. flava. In the second edition of Species Plantarum (p. 1495. 1763) Linnaeus credited the epithet to Jacquin and cited as supporting literature references to Jacquin (1763), Sloane, and Browne. Fawcett and Rendle (Fl. Jam. 5: 193, 194. 1926) selected as the lectotype the Browne specimen in the Linnaean Herbarium. Presumably this is part of sheet 1224.3 and is the solitary detached leaf on the right-hand side. Fawcett and Rendle cited the distribution of Clusia flava as Jamaica, Barbados, Grand Cayman, and the Florida Keys. The species is indeed well represented by recent collections from Jamaica and has been recollected recently by George Proctor on Grand Cayman (Proctor 15141 [GH]). The occurrence of this species in Barbados is not supported by specimens in any herbarium collections I have seen. The reference to its occurrence in the Florida Keys is apparently obtained from the writings of Nuttall (N. Amer. Sylva 2: 58. pl. 77. 1859) who stated of Clusia flava, "This singular and splendid tree is a native of Jamaica, and Cavenne in South America, where it is found among rocks on the declivities of mountains. We have now also to record it as a native of Key West in Florida, where it has recently been found, with so many other tropical productions, by Dr. Blodgett." The illustration given by Nuttall is clearly that of C. flava; however, there are no supporting herbarium vouchers cited and one wonders if the illustration was not made from other herbarium material. Blodgett's collections are preserved in the herbarium of the New York Botanical Garden where there are two sheets labelled "Clusia flava" collected by Dr. Blodgett. One sheet bears the common name "Bull Bay" and is from Pine Key. The other sheet without a common name was collected on Key West. Both specimens are sterile; however, both have heavier leaf blades than does C. flava and both specimens, I believe, should be referred to C. rosea. In further reference to Nuttall's statement, I have seen no material of C. flava from Cayenne. Clusia flava appears to be restricted to Jamaica and Grand Cayman.

Fawcett and Rendle and authors of other modern floras of the Antilles do not accept the two varieties of *Clusia flava* proposed by Planchon and Triana (q.v.).

### Clusia rosea Jacq.

This species was described briefly by Jacquin (Enum. 34. 1760) with the supporting citation "Catesb. car. 2, p. 99. t. 99." In the Selectarum (270. 1763) Jacquin supplied the additional references of "Plum. gen. 21." and "Pluk. alm. 92. t. 157. f. 2." and gave a full description. In the first edition of Catesby's work (1743), the plant is described and illustrated with white petals. In the second edition (1754), the illustration shows rose-

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colored petals. The text refers to the petals as "white with rose streaks." Jacquin did not illustrate the species in his Selectarum, but he reported it to be from Santo Domingo. In 1926, Fawcett and Rendle selected as the "type" the Bahama specimen collected by Catesby and now in the herbarium of the British Museum.

In modern floras, Clusia rosea is reported to occur in Florida, the Bahamas, the Greater and Lesser Antilles, Trinidad, Central America, and Venezuela. I have not seen all of the specimens cited by various authors for this species but a study of many specimens labeled C. rosea led to the conclusion that it occurs only in Southern Florida, the Bahamas, the Greater Antilles (Cuba, Jamaica, Hispaniola, and Puerto Rico), and the Virgin Islands (St. Thomas, St. Martins, St. Jan, and Anguilla). All of the material I have seen from Trinidad is best referred to C. palmicida L. C. Rich., although I have some doubt about the application of that name. The specimens labeled C. rosea from northern South America and from Central America do not represent that species as typified by the Catesby plant from the Bahamas.

### Clusia plukenetii Urb.

Both Jacquin (Select. 270. 1763) and Linnaeus (Sp. Pl. ed. 2. 1495. 1763) cited the polynomial by Plukenet in the references given for Clusia rosea. Fawcett and Rendle (Fl. Jam. 5: 192. 1926) did the same. Urban, in 1908 (Symb. Antill. 5: 432.), described C. plukenetii, gave the Plukenet reference and polynomial, and cited specimens from Martinique, St. Lucia, and Barbados, but did not designate a type. The Plukenet reference is to a poor illustration of a plant reported to occur in Barbados. It shows a branch with alternate leaves except for two very small leaves at the apex of the stem. Mr. George Proctor has informed me that a specimen of Clusia credited to Plukenet is in the Sloane Herbarium (Vol. 95, p. 152, upper right). It consists of only three leaves but is probably the holotype of Plukenet's polynomial and therefore of Urban's species. The common name of "Balsam apple" reported by Plukenet is appropriate for the genus Clusia. This species has been discussed under C. major. It is not comparable to C. rosea, and the name should not be used in the synonymy of that species as it has been by many recent authors.

#### Clusia minor L.

The protologue of this species as given by Linnaeus is the following: 2. CLUSIA foliis venosis, minor

Clussa, flore roseo, minor, fructu flavescente, Plum. gen. 21. Habitat in America meridionali. 5 Arbor foliis venosis. Racemus florum terminalis.

Jacquin in his Enumeratio described Clusia venosa as "C. foliis venosis" and cited "Plum. ic. 87. f. 2." The Plumier references used by Linnaeus and Jacquin are comparable, although the latter (Ic. 87. f. 2) expands on



FIG. 2. Lectotype of *Clusia minor* L. FIG. 88, Dessin à la plume "Clusia flore roseo minor, fructu e viridi rubra" from Manuscript No. 6, Plumier, *Botanicum Americanum*, t. VI. Courtesy of the Muséum National d'Histoire Naturelle, Paris.

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the former (Gen. 21) and is accompanied by an illustration. One can conclude, therefore, that Jacquin in his Enumeratio supplied an illegitimate substitute name for C. minor L. In the Selectarum, however, Jacquin refers to "Clusia (venosa) foliis venosis. Linn. sp. pl. 2. p. 510." but supplements this with a vague description which some subsequent authors felt represented a different species. It is clear from Jacquin's use of Clusia venosa in 1760 that this name must be considered a synonym of C. minor L. In the second edition of Species Plantarum (p. 1495. 1763) Linnaeus accepted the specific epithet "venosa" given by Jacquin and abandoned his own "minor," but did not use Jacquin's name nor refer to Jacquin's publication as he did for the three segregate species of Clusia major. This action seems to indicate that Linnaeus felt C. venosa Jacq. was the same as his C. minor. Planchon and Triana typified Clusia minor by the unpublished plate numbered 88 in the Plumier manuscript. They recognized that this drawing was not finished in the characteristic manner of Plumier's other drawings but stated that with alterations it was comparable to fig. 2 of plate 87 in the Burmann edition of Plantae Americanae. Planchon and Triana, to clarify this species, printed the original, previously unpublished description and commentary by Plumier and compared these with existing herbarium specimens available to them. Either the original Plumier drawing, reproduced here as FIG. 2, or the Burmann version with corrections will serve to typify the species. Clusia minor L. is clearly defined in modern floras.

#### Clusia venosa Jacq. (1763 not 1760)

Planchon and Triana (*loc. cit.* 369) were troubled by the description of *Clusia venosa* supplied by Jacquin in the *Selectarum* (273. 1763). In their manuscript, they described *Clusia mangle*, crediting the name to L. C. Richard on the basis of a manuscript notation. In a discussion of this species they state, "D'après le nom de *Palétuvier de montagne* que porte à la Martinique le *Clusia venosa* de Jacquin (non L.) on pourrait croie que cette espèce est identique avec celle que nous décriverons ici. Mais la description de la plante de Jacquin ne justiferait en aucun point une telle détermination." Planchon and Triana do not otherwise place *C. venosa* Jacq. (1763).

In 1893 J. Vesque (DC. Monographiae Phanerogamarum 8: 140, 57. 1893) listed both C. venosa Jacq. (1763) and C. mangle Rich. ex Planch. & Triana. For C. venosa Vesque stated, "Il est impossible de classer avec certitude la plante visée par Jacquin. C'est probablement une espèce de la section Anandrogyne, voisine du Cl. Mangle qui, à ce qu'il paraît, porte le même nom vulgaire de 'palétuvier de montagne'." Vesque placed as supporting literature the polynomial and plate references which Planchon and Triana had used in defining C. minor. Vesque did not cite Jacquin's Enumeratio of 1760, but listed only the Selectarum of 1763. There is an implication in the work of these men that C. venosa Jacq. as used in 1760 and defined in 1763 represent two different plants. The description Jacquin

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used in 1763 does not clearly define either C. minor L. (C. venosa Jacq. 1760) or Clusia mangle L. C. Rich. ex Planch. & Triana, except as the common name applies to the later species.

Engler (Nat. Pflanzenfam. 21: 201. 1925) considered *Clusia mangle* to be a synonym of *Clusia venosa* Jacq. This decision can not be accepted. Grisebach (Flora Brit. W. Indies 107. 1859) used *Clusia venosa* Jacq. "exclus. syn. Plum." and the Imray collection he cited is *Clusia mangle*. This treatment, too, is invalid. *Clusia mangle* L. C. Rich. ex Planch. & Triana is typified by a Richard collection from the Soufrière in Guadeloupe. The species is known from Martinique, Dominica, and Guadeloupe. It is characterized by long peduncled cymes, small globose fruits about 2 cm. in diameter and by subsessile or short-petioled leaves. The identity of *Clusia venosa* Jacq. 1763 remains unsolved but the epithet is a later homonym of *Clusia venosa* Jacq. 1760 which is a synonym of *Clusia minor* L. of 1753.

## Clusia grisebachiana (Planchon & Triana) Alain

Grisebach described *Tovomita clusioides* for a plant from Cuba (T. clusioides Griseb. Mem. Amer. Acad. II. 8: 166. 1860, not *T. clusioides* [Choisy] Cambessèdes, 1828). Planchon and Triana recognized the earlier homonym and renamed the species in honor of Grisebach. They retained the species in the genus *Tovomita*, but expressed some doubt as to its proper assignment (*Tovomita* (?) grisebachiana Planch. & Triana, Ann. Sci. Nat. IV. 14: 284. 1860). Alain correctly transferred the species to

the genus Clusia (Fl. Cub. 3: 314. 1953).

Urban described *Clusia krugiana* (Repert. Sp. Nov. 20: 340. 1924) from Puerto Rico and *C. abbottii* (Symb. Antill. 1: 367. 1899) from the Dominican Republic. Schmidt indicated on the herbarium labels of several Ekman collections that he believed *C. abbottii* belonged in the synonymy of *C. krugiana*. In as much as Schmidt's work was never published, this lead was reexamined on the basis of more recent collections and the type collections of each species. Only minor differences in leaf size, those partly of age, separate these three supposedly endemic species and they should be considered as one.

#### CALOPHYLLUM CALABA

A common tree of the Lesser Antilles, often used as a wind break, has a widely used common name of "galba." Regrettably, the scientific name used in modern floras is less consistent. Grisebach (Flora Brit. W. Indies 108. 1859), Urban (Symb. Antill. 8: 438. 1920), and Duss (Ann. Inst. Colon. Marseille 13: 103. 1896) use *Calophyllum calaba* L. Britton & Wilson (Sci. Surv. Porto Rico 5: 584. 1924) and Williams (Fl. Trinidad & Tobago 1: 62. 1929) use *Calophyllum antillanum* Britt. Fawcett and Rendle (Fl. Jam. 5: 200. 1926) use *Calophyllum jacquinii* Fawc. & Rend., while Moscoso (Cat. Fl. Dom. 378. 1943) and Leon and Alain (Fl. Cub. 3: 309. 1953) use *Calophyllum brasiliense* Camb. var. *antillanum* (Britt.)

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Standl. Recently Furtado (Gard. Bull. Straits Settlements 11: 258–260. 1941) suggested the typification of *Calophyllum calaba* L. and his proposals seem acceptable.

Linnaeus (Sp. Pl. 514. 1753) proposed the name Calophyllum calaba citing four earlier references and referring to the origin of the plant as in "Indiis," thereby implying that the plant occurred in both the Old World and the New World. The first generic description is given by Linnaeus in 1754 (Gen. Pl. ed. 5. 229.) where only the reference to Plumier's Calaba is given. The Plumier reference is not given as such in the first edition of Species Plantarum, but is included in the reference Linnaeus gave to his Flora Zeylanica (90. 1747). In 1763, Jacquin elaborated on Linnaeus' description (Select. Stirp. Amer. 269. t. 165. 1763), citing both the works of Plumier and Linnaeus, thereby implying a New World origin. In the sixth edition of Genera Plantarum (p. 266. 1764), Linnaeus accepted Jacquin's treatment. The monographers Planchon and Triana (Ann. Sci. Nat. IV. 15: 249. 1861), Vesque (DC. Monogr. Phan. 8: 588. 1893), and Engler (Nat. Pflanzenfam. 21: 196. 1925) restricted Calophyllum calaba in application to plants of the New World but credit the name to Jacquin. Hitchcock and Greene (Prop. Brit. Bot. 161. 1929) suggested that the species be typified by Jacquin's interpretation of Linnaeus' name. More recently, Swartz in preparing the Index Nominum Genericorum cards cited as the lectotype for Calophyllum L. (Sp. Pl. 513. 1753) "C. calaba Linnaeus vide Gen. Pl. ed. 5. 229. 1754; etiam vide M. L. Green, Prop. Brit. Bot. 161. 1929)."

The acceptable synonymy therefore is:

Calophyllum calaba L. Sp. Pl. 514. 1753; Gen. Pl. ed. 5. 229. 1754; Jacquin, Sel. Stirp. Amer. 269. t. 165. 1763.

Calophyllum antillanum Britt. in Britton & Wilson, Sci. Surv. Porto Rico 5: 584. 1924.

Calophyllum jacquinii Fawc. & Rendl., Fl. Jam. 5: 584. 1924.
Calophyllum brasiliense Camb. var. antillanum (Britt.) Standl. Trop. Woods 30: 6. 1932.

Britton had rejected the Jacquin interpretation of *Calophyllum calaba* as a species of the New World and had proposed the name *C. antillanum* for the American elements. Fawcett and Rendle reached the same conclusion, proposing *C. jacquinii* in apparent unawareness of Britton's earlier publication. Standley felt that the West Indian plants represented only a geographical extension of a Brazilian species and proposed several varieties including the combination *Calophyllum brasiliense* var. *antillanum*. If the Antillean material is different from that of Central and South America at the varietal level, many of Standley's varieties must be transferred to the older specific name *Calophyllum calaba* L. typified by plants in the Antilles.

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#### RHEEDIA LATERIFLORA

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Linnaeus (Sp. Pl. 1193. 1753) based this species on the work of Plumier (Gen. 45. 1703). Plumier did not specify the country of origin of the plant, but Lamarck (Encyc. 2: 245. 1786) noted the plant to be abundant in the Cul-de-sac aux Frégates in Martinique, an area visited by Plumier. Urban cites the distribution of the species as Jamaica, Hispaniola, Montserrat, Guadeloupe, Dominica, Martinique, St. Vincent, and Trinidad (Repert Sp. Nov. Beih. 5: 98. 1920). In spite of a study of recent collections from Guadeloupe, Dominica, Martinique, Marie Galante, Grenada, and Jamaica the species remains poorly understood. There have been no recent collections from Hispaniola and even the assignment of plants from Jamaica to this species is questionable. The synonymy of this species is the following:

Rheedia lateriflora L. Sp. Pl. 1193. 1753.

Mammea humilis Vahl, Eclog. Amer. 2: 40, t. 20. 1798.
Mammea humilis var. macrophylla (Mart.) Duss, Ann. Inst. Col. Marseille 13: 102. 1897.
Mammea humilis var. vahlii Griseb. Fl. Brit. W. Indies 108. 1859.
Mammea humilis var. plumieri Griseb. Ibid.

Vahl's species is based on a Ryan collection from Montserrat. Grisebach's two varieties are based respectively on the Vahl and Plumier types. Grisebach described var. vahlii as shrubby with the leaves pointed at both ends. His var. plumieri was a tree with the leaves rounded or subcordate at the base. The specimens I have seen are variable in leaf shape and both types of leaf-bases can be found on one branch. Usually the leaves of young plants and of the lateral or axillary branches of older plants have the acute leaf bases. Most modern workers consider Garcinia macrophylla Mart., the basionym of Rheedia macrophylla (Mart.) Planchon & Triana and of Duss' var. macrophylla, to be a distinct species. The specimens Duss cited are to be referred to Rheedia lateriflora.

